

**MINNESOTA RULES, CHAPTER 1323**  
**ADOPTION OF THE 2012 INTERNATIONAL ENERGY**  
**CONSERVATION CODE (IECC)**  
**(COMMERCIAL PROVISIONS)**

**1323.0010 INCORPORATION OF INTERNATIONAL ENERGY CONSERVATION CODE (IECC) BY REFERENCE.**

Subpart 1. **Generally.** The 2012 edition of the International Energy Conservation Code (IECC) as promulgated by the International Code Council (ICC), Falls Church, Virginia, is incorporated by reference and made part of the Minnesota State Building Code except as qualified by the applicable provisions in Minnesota Rules, chapter 1300, and as amended in this chapter. The IECC is not subject to frequent change and a copy of the IECC, with amendments for use in Minnesota, is available in the office of the commissioner of labor and industry. Portions of this chapter reproduce text and tables from the IECC. The IECC is copyright 2011 by the ICC. All rights reserved.

Subpart 2. **Mandatory chapters.** The 2012 IECC CE Chapters 2 through 5, must be administered by any municipality that has adopted the code, except as qualified by the applicable provisions in Minnesota Rules, chapter 1300, and as amended by this chapter.

Subpart 3. **Replacement chapters.** The following 2012 IECC chapters are being deleted and replaced with the provisions listed below:

A. Chapter 1(CE) of the 2012 IECC and any references to code administration in this code are deleted and replaced with Minnesota Rules, chapter 1300, Minnesota Administration Code.

**1323.0020 REFERENCES TO OTHER INTERNATIONAL CODE COUNCIL (ICC) CODES.**

Subpart 1. **Generally.** References to other codes and standards promulgated by the International Code Council in the 2012 International Energy Conservation Code are modified in subparts 2 to 11.

Subpart 2. **Building code.** References to the International Building Code in this code mean the Minnesota Building Code, adopted pursuant to Minnesota Rules, chapter 1305, and Minnesota Statutes, section 326B.106, subdivision 1.

Subpart 3. **Residential code.** References to the International Residential Code in this code mean the Minnesota Residential Code, adopted under Minnesota Rules, chapter 1309, and Minnesota Statutes, section 326B.106, subdivision 1.

Subpart 4. **Electrical code.** References to the International Code Council, Electrical Code in this code mean the Minnesota Electrical Code, Minnesota Rules, chapter 1315, adopted under Minnesota Statutes, section 326B.35.

Subpart 5. **Fuel gas code.** References to the International Fuel Gas Code in this code mean the Minnesota Mechanical Code, Minnesota Rules, chapter 1346, adopted under Minnesota Statutes, section 326B.106, subdivision 1.

Subpart 6. **Mechanical code.** References to the International Mechanical Code in this code mean the Minnesota Mechanical Code, Minnesota Rules, chapter 1346, adopted under Minnesota Statutes, section 326B.106, subdivision 1.

Subpart 7. **Plumbing code.** References to the International Plumbing Code in this code mean the Minnesota Plumbing Code, Minnesota Rules, chapter 4715, adopted under Minnesota Statutes, section 326B.106, subdivisions 1 and 2.

Subpart 8. **Private sewage disposal code.** References to the International Private Sewage Disposal Code in this code mean the Minnesota Pollution Control Agency's minimum standards and criteria for individual sewage treatment systems in Minnesota Rules, chapter 7080, adopted under Minnesota Statutes, chapters 103F, 103G, 115, and 116.

Subpart 9. **Energy conservation code.** References to the International Energy Conservation Code in this code mean the Minnesota Energy Code, Minnesota Rules, chapter 1322 and chapter 1323 adopted under Minnesota Statutes, section 326B.106.

Subpart 10. **Property maintenance code.** References to the International Property Maintenance Code in this code do not apply.

Subpart 11. **Accessibility code.** References to accessibility in this code mean the Minnesota Accessibility Code, Minnesota Rules, chapter 1341.

### **1323.0030 ADMINISTRATIVE PROCEDURE CRITERIA.**

Procedures relating to the administration and enforcement of this code under Minnesota Statutes, section 326B.101, are contained in Minnesota Rules, chapter 1300, Minnesota Administration Code. Minnesota Rules, chapter 1300, governs the application of this code.

### **1323.0040 VIOLATION.**

A violation of this code is a misdemeanor under Minnesota Statutes, section 326B.082.

### **1323.0100, ADMINISTRATION FOR COMMERCIAL ENERGY CODE**

Subpart 1. Notwithstanding 1323.0030, the following administrative provisions apply.

A. **Scope.** This Code applies to Commercial Buildings and the building sites and associated systems and equipment.

**B. Additions, alterations, renovations or repairs.** Additions, alterations, renovations or repairs to an existing building, building system or portion thereof shall conform to the provisions of this code as they relate to new construction without requiring the unaltered portion(s) of the existing building or building system to comply with this code. Additions, alterations, renovations or repairs shall not create an unsafe or hazardous condition or overload existing building systems. An addition shall be deemed to comply with this code if the addition alone complies or if the existing building and addition comply with this code as a single building.

**Exception:** The following need not comply provided the energy use of the building is not increased:

1. Storm windows installed over existing fenestration.
2. Glass only replacements in an existing sash and frame.
3. Existing ceiling, wall or floor cavities exposed during construction provided that these cavities are filled with insulation.
4. Construction where the existing roof, wall or floor cavity is not exposed.
5. Reroofing for roofs not covered by Section C402.2.1.2, where neither the sheathing nor the insulation is exposed. Roofs without insulation in the cavity and where the sheathing or insulation is exposed during reroofing shall be insulated either above or below the sheathing.
6. Replacement of existing doors that separate *conditioned space* from the exterior shall not require the installation of a vestibule or revolving door, provided, however, that an existing vestibule that separates a *conditioned space* from the exterior shall not be removed.
7. Alterations that replace less than 50 percent of the luminaires in a space provided that such alterations do not increase the installed interior lighting power.
8. Alterations that replace only the bulb and ballast within the existing luminaires in a space provided that the *alteration* does not increase the installed interior lighting power.

**Change in occupancy or use.** Spaces under-going a change in occupancy that would result in an increase in demand for either fossil fuel or electrical energy shall comply with this code. Where the use in a space changes from one use in Table C405.5.2(1) or (2) to another use in Table C405.5.2(1) or (2), the installed lighting wattage shall comply with Section C405.5.

**Change in space conditioning.** Any non-conditioned space that is altered to become *conditioned space* shall be required to be brought into full compliance with this code.

**Mixed occupancy.** Where a building includes both *residential* and *commercial* occupancies, each occupancy shall be separately considered and meet the applicable provisions of IECC-Commercial Provisions of IECC- Residential Provisions.

**Compliance.** *Residential buildings* shall meet the provisions of IECC-Residential Provisions. *Commercial buildings* shall meet the IECC-Commercial Provisions..

**Compliance materials.** The *code official* shall be permitted to approve specific computer software, worksheets, compliance manuals and other similar materials that meet the intent of this code.

**Low energy buildings.** The following buildings, or portions thereof, separated from the remainder of the building by *building thermal envelope* assemblies complying with this code

shall be exempt from the *building thermal envelope* provisions of this code:

1. Those with a peak design rate of energy usage less than 3.4 Btu/h·ft<sup>2</sup> (10.7 W/m<sup>2</sup>) or 1.0 watt/ft<sup>2</sup> (10.7 W/m<sup>2</sup>) of floor area for space conditioning purposes.
2. Those that do not contain *conditioned space*.

**Information on construction documents.** Construction documents shall be drawn to scale upon suitable material. Electronic media documents are permitted to be submitted when approved by the code official. Construction documents shall be of sufficient clarity to indicate the location, nature and extent of the work proposed, and show in sufficient detail pertinent data and features of the building, systems, and equipment as herein governed. Details shall include, but are not limited to, as applicable, insulation materials and their *R*-values; fenestration *U*-factors and SHGCs; area-weighted *U*-factor and SHGC calculations; mechanical system design criteria; mechanical and service water heating system and equipment types, sizes and efficiencies; economizer description; equipment and systems controls; fan motor horsepower (hp) and controls; duct sealing, duct sizing, duct and pipe insulation and location, terminal air or water design flow rates; electrical distribution diagram(s), lighting fixture schedule with wattage and control narrative; and air sealing details. Air sealing details shall clearly delineate the air barrier location and show continuity between roof, wall, foundation, around frames and sleeves, and at other similar openings.

### **1323.0201 SECTION R201, GENERAL.**

IECC Section C201.4 is amended to read as follows:

**C201.4 Terms not defined.** Where terms are not defined through the methods authorized by this chapter, the Merriam-Webster Collegiate Dictionary, available at [www.m-w.com](http://www.m-w.com), shall be considered as providing ordinarily accepted meanings. The dictionary is incorporated by reference, is subject to frequent change, and is available through the Minitex interlibrary loan system.

### **C202 SECTION R202, GENERAL DEFINITIONS.**

**BUILDING THERMAL ENVELOPE.** The basement walls, exterior walls, floor, roof, air barrier, and any other building envelope components that enclose conditioned space or provides a boundary between conditioned space and exempt or unconditioned space.

**COEFFICIENT OF PERFORMANCE (COP) – HEATING.** The ratio of the rate of heat delivered to the rate of energy input, in consistent units, for a complete heat pump system, including the compressor and, if applicable, auxiliary heat, under designated operating conditions.

**Continuous Insulation (c.i.).** Insulation that is continuous across all structural members without thermal bridges other than fasteners and service openings. It is installed on the interior or exterior or is integral to any opaque surface of the *building thermal envelope*.

**INFILTRATION.** The uncontrolled inward air leakage into a building caused by the pressure effects of wind or, the effect of differences in the indoor and outdoor air density, or imbalance between supply and exhaust air systems.

**ROOF REPLACEMENT.** An alteration consisting of the removal of the existing roof covering, repairing any damaged substrate and installing a new roof covering.

### **1323.0303 SECTION R303, MATERIALS, SYSTEMS AND EQUIPMENT**

**IECC Section C303.1.** IECC Section C303.1 is amended to read as follows:

**C303.1 Identification.** Materials, systems and equipment shall be identified in a manner that will allow a determination of compliance with the applicable provisions of this code. Materials shall be designed for the intended use, and installed in accordance with the manufacturers installation instructions, any listing, or certifications required.

### **1323.0401 Section C401, GENERAL**

**C401.2 Application.** Commercial buildings shall comply with one of the following:

1. The requirements of ANSI/ASHRAE/IESNA 90.1 and C401.3.
2. The requirements of Sections C401.3, C402, C403, C404 and C405. In addition, commercial buildings shall comply with either Section C406.2, C406.3 or C406.4.
3. The requirements of Section C401.3, C407, C402.4, C403.2, C404, C405.2, C405.3, C405.4, C405.6 and C405.7. The building energy cost shall be equal to or less than 85 percent of the standard reference design building.

**C401.2.1 Application to existing buildings.** Additions, alterations and repairs to existing buildings shall comply with one of the following:

1. Sections C401.3, C402, C403, C404 and C405; or
2. ANSI/ASHRAE/IESNA 90.1 and C401.3.

### **C401.3 Additional requirements.**

#### **C401.3.1 Prohibition of Heated Commercial Parking Facilities.**

Persuant to 216c.20 Subpart 3 an enclosed structure or portion of an enclosed structure used primarily as a parking garage or ramp for three or more motor vehicles shall not be heated.

#### **Exceptions:**

- (a) Parking facilities where a majority of parking spaces are within the same building structure as dwelling unit occupancies.
- (b) Parking facilities used exclusively to house vehicles for public emergency, ambulance, or public utility emergency response.
- (c) Parking facilities that are incidentally heated by building relief or environmental exhaust air, excluding exhaust air containing odors, noxious fumes, or high moisture levels. The use of relief or environmental exhaust air shall not create a safety hazard.

**C401.3.2 Parking lot lighting.** Parking lot lighting shall be in accordance with Minnesota Rules, chapter 8885.

**C401.3.3 Inflated structures.** Inflated structures with heating capacity installed are regulated by this section.

**C401.3. 3.1 Envelope requirements.** Foundation walls and slab-on-grade floors must meet the requirements of this rule for semiheated spaces.

**C401.3. 3.2 Membrane insulation.** Membranes must have a minimum insulation value of R-12.

**Exception:** Inflated structures that are designed to deflate during the summer months.

**C401.3.3.3 Air pressure controls.** Structure air pressure must have capacity to be controlled both manually and automatically with respect to outdoor wind speed

**C401.3.4 Solar Thermal collectors.** Solar thermal collectors shall be listed and labeled as meeting SRCC Standard OG-100.

**C401.3.5 Solar Water Heating Systems.** Solar water heating systems shall be either:

1. listed and labeled as meeting SRCC Standard OG-300 or
2. shall meet the provisions of Minnesota Rules Chapters 4715 and 1315

**C401.3.6 Photovoltaic Modules and Systems:** Photovoltaic modules and systems shall meet the requirements of Mn rules Chapter 1315

## **1323.0402 Section C402, BUILDING ENVELOPE REQUIREMENTS**

### **C402.2 Specific Insulation Requirements (Prescriptive).**

Opaque assemblies shall comply with Table C402.2. Where two or more layers of continuous insulation board are used in a construction assembly, the continuous insulation boards shall be installed in accordance with section C303.2. If the continuous insulation board manufacturer's installation instructions do not address installation of two or more layers, the edge joints between each layer of continuous insulation boards shall be staggered. When components of the *building thermal envelope* do not meet the definition of *continuous insulation*, Table C402.1.2 shall be used and the U-factors of those non-continuous insulation components shall be calculated using ANSI/ASHRAE/IES Standard 90.1 Appendix A.

**C402.2.1.2 Insulation Requirements for Roof Replacement.** For roof replacement on an existing building with insulation entirely above the deck and where the roof slope is less than two units vertical in 12 units horizontal, the insulation shall conform to the energy conservation requirements as specified in Table C402.2.

**Exception:** Where the required R-value cannot be provided due to thickness limitations presented by existing rooftop conditions, including heating, ventilation and air-conditioning equipment, low door or glazing heights, parapet heights, proper roof flashing heights, the maximum thickness of insulation compatible with the available space and existing uses shall be installed.

#### **C402.2.5 Floors over outdoor air or unconditioned space.**

The minimum thermal resistance (*R*-value) of the insulating material installed either between the floor framing or continuously on the floor assembly shall be as specified in Table C402.2, based on construction materials used in the floor assembly.

"Mass floors" shall include floors weighing not less than:

1. 35 psf (170 kg/m<sup>2</sup>) of floor surface area; or
2. 25 psf (120 kg/m<sup>2</sup>) of floor surface area if the material weight is not more than 120 pcf (1,900 kg/m<sup>3</sup>).

**TABLE C402.3.3.1 SHGC ADJUSTMENT MULTIPLIERS**

<b>PROJECTION FACTOR</b>	<b>ORIENTED WITHIN 45 DEGREES OF TRUE NORTH</b>	<b>ALL OTHER ORIENTATION</b>
$0.2 \leq PF < 0.5$	1.1	1.2
$PF \geq 0.5$	1.2	1.6

#### **C402.4.1.1 Air barrier construction.**

The *continuous air barrier* shall be constructed to comply with the following:

1. The air barrier shall be continuous for all assemblies that are the thermal envelope of the building and across the joints and assemblies.
2. Air barrier joints and seams shall be sealed, including sealing transitions in places and changes in materials. Air barrier penetrations shall be sealed in accordance with Section C402.4.2. The joints and seals shall be securely installed in or on the joint for its entire length so as not to dislodge, loosen or otherwise impair its ability to resist positive and negative pressure from wind, stack effect and mechanical ventilation.
3. Recessed lighting fixtures shall comply with Section C402.4.8. Where similar objects are installed which penetrate the air barrier, provisions shall be made to maintain the integrity of the air barrier.

**(We intend for the Exception to be removed)**

#### **C402.4.5.1 Stairway and shaft vents.**

Stairway and shaft vents shall be provided with Class I motorized dampers with a maximum leakage rate of 4 cfm/ft<sup>2</sup> (20.3 L/s • m<sup>2</sup>) at 1.0 inch water gauge (w.g.) (249 Pa) when tested in accordance with AMCA 500D.

Stairway and shaft vent dampers shall be installed with controls so that they are capable of being automatically closed during normal building operation and to open as required by fire and/or smoke detection systems or Authorities Having Jurisdiction (AHJ).

**(We intend for Items 1 and 2 to be removed)**

#### **C402.4.5.2 Outdoor air intakes and exhausts.**

*Outdoor air* supply and exhaust openings shall be provided with Class IA motorized dampers with a maximum leakage rate of 4 cfm/ft<sup>2</sup> (20.3 L/s • m<sup>2</sup>) at 1.0 inch water gauge (w.g.) (249 Pa)

when tested in accordance with AMCA 500D.

**Exceptions:**

1. Gravity (nonmotorized) dampers having a maximum leakage rate of 20 cfm/ft<sup>2</sup> (101.6 L/s m<sup>2</sup>) at 1.0 inch water gauge (w.g.) (249 Pa) when tested in accordance with AMCA 500D are permitted to be used as follows:

~~1.1 In buildings for exhaust and relief dampers.~~

~~1.2~~ 1.1 In buildings less than three stories in height above grade.

~~1.3 For ventilation air intakes and exhaust and relief dampers in buildings of any height located in Climate Zones 1, 2 and 3.~~

~~1.4~~ 1.2 Where the design outdoor air intake or exhaust capacity does not exceed 300 cfm (141 L/s).

Gravity (nonmotorized) dampers for ventilation air intakes shall be protected from direct exposure to wind.

2. ~~Non-motorized~~ dampers smaller than 24 inches (610 mm) in either dimension shall be permitted to have a leakage of 40 cfm/ft<sup>2</sup> (203.2 L/s • m<sup>2</sup>) at 1.0 inch water gauge (w.g.) (249 Pa) when tested in accordance with AMCA 500D.

**C402.4.7 Vestibules.**

All building entrances shall be protected with an enclosed vestibule, with all doors opening into and out of the vestibule equipped with self-closing devices. Vestibules shall be designed so that in passing through the vestibule it is not necessary for the interior and exterior doors to open at the same time. The installation of one or more revolving doors in the building entrance shall not eliminate the requirement that a vestibule be provided on any doors adjacent to revolving doors.

"Interior and exterior doors shall have a minimum distance between them of not less than 7 feet when in the closed position."

**Exceptions:**

1. Buildings in Climate Zones 1 and 2.

2. Doors not intended to be used by the public, such as doors to mechanical or electrical equipment rooms, or intended solely for employee use.

3. Doors opening directly from a *sleeping unit* or dwelling unit.

4. Doors that open directly from a space less than 3,000 square feet (298 m<sup>2</sup>) in area.

5. Revolving doors.

6. Doors used primarily to facilitate vehicular movement or material handling and adjacent personnel doors.

**C402.4.8 Recessed lighting.**

Recessed luminaires installed in the *building thermal envelope* shall be sealed to limit air leakage between conditioned and unconditioned spaces. All recessed luminaires shall be IC-rated and *labeled* as having an air leakage rate of not more than 2.0 cfm (0.944 L/s) when tested in accordance with ASTM E 283 at a 1.57 psf (75 Pa) pressure differential. All recessed luminaires shall be sealed with a gasket or caulk between the housing and interior wall or ceiling covering.



## 1323.0403 Section C403, BUILDING MECHANICAL SYSTEMS

**C403.2.1 Calculation of heating and cooling loads.** IECC Section C303.1 is amended to read as follows:

**C403.2.1 Calculation of heating and cooling loads.** Design loads shall be determined in accordance with the procedures described in ANSI/ASHRAE/ACCA Standard 183, ~~(delete the remainder of the paragraph and replace with the following)~~ “Peak Cooling and Heating Load Calculations in Buildings Except Low-Rise Residential Buildings” and using the design parameters specified in Table 403.2.1

**Table C403.2.1 Climatic Data Design Conditions**

City	Summer Db/Wb °F	Winter Db °F
Aitkin	82/72	-24
Albert Lea	85/72	-15
Alexandria	86/70	-21
Bemidji	84/68	-24
Cloquet	82/68	-20
Crookston	84/70	-27
Duluth	81/67	-20
Ely	82/68	-29
Eveleth	82/68	-26
Faribault	86/73	-16
Fergus Falls	86/71	-21
Grand Rapids	81/67	-23
Hibbing	82/68	-19
International Falls	83/67	-28
Litchfield	85/71	-18
Little Falls	86/71	-20
Mankato	86/72	-15
Minneapolis/St. Paul	88/72	-15
Montevideo	86/72	-17
Mora	84/70	-21
Morris	84/72	-21
New Ulm	87/73	-15
Owatonna	86/73	-16
Pequot Lake	84/68	-23
Pipestone	85/73	-15
Redwood Falls	89/73	-17
Rochester	85/72	-17
Roseau	82/70	-29
St. Cloud	86/NA	-20
Thief River	82/68	-25

Tofte	75/61	-14
Warroad	83/67	-29
Wheaton	84/71	-20
Willmar	85/71	-20
Winona	88/74	-13
Worthington	84/71	-14
DB = dry bulb temperature, degrees Fahrenheit		
WB = wet bulb temperature, degrees Fahrenheit		

### **C403.2.2 Equipment and system sizing.**

The output capacity of heating and cooling equipment and systems shall not exceed the loads calculated in accordance with Section C403.2.1. A single piece of equipment providing both heating and cooling shall satisfy this provision for one function with the capacity for the other function as small as possible, within available equipment options.

#### **Exceptions:**

1. Required standby equipment and systems provided with controls and devices that allow such systems or equipment to operate automatically only when the primary equipment is not operating.
2. Multiple units of the same equipment type with combined capacities exceeding the design load and provided with controls that have the capability to sequence the operation of each unit based on load.
3. Heating and cooling equipment sizing may be up to 10% greater than the calculated peak heating and cooling loads to allow for building pickup and cool down after temperature setback conditions.

### **TABLE C403.2.3(1) MINIMUM EFFICIENCY REQUIREMENTS: ELECTRICALLY OPERATED UNITARY AIR CONDITIONERS AND CONDENSING UNITS**

In the table C403.2.3(1) in the row entitled "Condensing Units, water cooled" "Greater than or equal to 135,000 Btus/h". In the minimum efficiency column of the table under the heading "as of 6-1-2011" Change the 14.00 IEER to 11.8 IEER

### **Table C403.2.3(3) MINIMUM EFFICIENCY REQUIREMENTS: ELECTRICALLY OPERATED PACKAGED TERMINAL AIR CONDITIONERS, PACKAGED TERMINAL HEAT PUMPS, SINGLE-PACKAGE VERTICAL AIR CONDITIONERS, SINGLE VERTICAL HEAT PUMPS, ROOM AIR CONDITIONERS AND ROOM AIR-CONDITIONER HEAT PUMPS**

In the table C403.2.3(3) in the row entitled "The Second Row titled Room Air Conditioners with louvered Slides" now reads "The Second Row titled Room Air Conditioners without louvered Slides"

(This is a new table that was added to the document)

Table C403.2.3(10)

~~TABLE 6.8.11~~ **Electrically Operated Variable Refrigerant Flow Air Conditioners—**  
**TABLE C403.2.3(10) Minimum Efficiency Requirements**

Equipment Type	Size Category	Heating Section Type	Sub-Category or Rating Condition	Minimum Efficiency	Test Procedure
VRF Air Conditioners, Air Cooled	<65,000 Btu/h	All	VRF Multi-split System	13.0 SEER	AHRI 1230
				11.2 EER	
	≥65,000 Btu/h and <135,000 Btu/h	Electric Resistance (or none)	VRF Multi-split System	12.5 IEER	
				13. IEER(as of 7/1/2012)	
	≥135,000 Btu/h and <240,000 Btu/h	Electric Resistance (or none)	VRF Multi-split System	11.0 EER 12.3 IEER	
				12. IEER(as of 7/1/2012)	
	≥240,000 Btu/h	Electric Resistance (or none)	VRF Multi-split System	10.0 EER 11.1 IEER 11.6 IEER (as of 7/1/2012)	

(This is a new table that was added to the document)

**TABLE 6.8.1J Electrically Operated Variable Refrigerant Flow Air-to-Air and Applied Heat Pumps—  
TABLE C403.2.3(11) Minimum Efficiency Requirements**

Equipment Type	Size Category	Heating Section Type	Subcategory or Rating Condition	Minimum Efficiency	Test Procedure
VRF Air cooled, (cooling mode)	<65,000 Btu/h	All	VRF Multisplit System	13.0 SEER	AHRI 12
	≥65,000 Btu/h and <135,000 Btu/h	Electric Resistance (or none)	VRF Multisplit System	11.0 EER 12.3 IEER 12.9 IEER (as of 7/1/2012)	
	≥65,000 Btu/h and <135,000 Btu/h	Electric Resistance (or none)	VRF Multisplit System with Heat Recovery	10.8 EER 12.1 IEER 12.7 IEER (as of 7/1/2012)	
	≥135,000 Btu/h and <240,000 Btu/h	Electric Resistance (or none)	VRF Multisplit System	10.6 EER 11.8 IEER 12.3 IEER (as of 7/1/2012)	
	≥135,000 Btu/h and <240,000 Btu/h	Electric Resistance (or none)	VRF Multisplit System with Heat Recovery	10.4 EER 11.6 IEER 12.1 IEER (as of 7/1/2012)	
	≥240,000 Btu/h	Electric Resistance (or none)	VRF Multisplit System	9.5 EER 10.6 IEER 11.0 IEER (as of 7/1/2012)	
	≥240,000 Btu/h	Electric Resistance (or none)	VRF Multisplit System with Heat Recovery	9.3 EER 10.4 IEER 10.8 IEER (as of 7/1/2012)	
	≥240,000 Btu/h	Electric Resistance (or none)	VRF Multisplit System with Heat Recovery	9.3 EER 10.4 IEER 10.8 IEER (as of 7/1/2012)	
VRF Water source (cooling mode)	<65,000 Btu/h	All	VRF Multisplit systems 86°F entering water	12.0 EER	AHRI 12
	<65,000 Btu/h	All	VRF Multisplit systems with Heat Recovery 86°F entering water	11.8 EER	
	≥65,000 Btu/h and <135,000 Btu/h	All	VRF Multisplit System 86°F entering water	12.0 EER	
	≥65,000 Btu/h and <135,000 Btu/h	All	VRF Multisplit System with Heat Recovery 86°F entering water	11.8 EER	
	≥135,000 Btu/h	All	VRF Multisplit System 86°F entering water	10.0 EER	
	≥135,000 Btu/h	All	VRF Multisplit System with Heat Recovery 86°F entering water	9.8 EER	
VRF Groundwater source (cooling mode)	<135,000 Btu/h	All	VRF Multisplit System 59°F entering water	16.2 EER	AHRI 12
	<135,000 Btu/h	All	VRF Multisplit System with Heat Recovery 59°F entering water	16.0 EER	
	≥135,000 Btu/h	All	VRF Multisplit System 59°F entering water	13.8 EER	
	≥135,000 Btu/h	All	VRF Multisplit System with Heat Recovery 59°F entering water	13.6 EER	

**TABLE 6.8.1K Air Conditioners and Condensing Units Serving Computers Rooms**

TABLE C403.2.3(12)		Minimum	Test
Equipment Type	Net Sensible Cooling Capacity <sup>a</sup>	SCOP-127 <sup>b</sup> Efficiency Downflow units / Upflow units	Procedure
Air conditioners, air cooled	<65,000 Btu/h	2.20 / 2.09	ANSI/ASHRAE 127
	≥ 65,000 Btu/h and < 240,000 Btu/h	2.10 / 1.99	
	≥ 240,000 Btu/h	1.90 / 1.79	
Air conditioners, water cooled	<65,000 Btu/h	2.60 / 2.49	ANSI/ASHRAE 127
	≥ 65,000 Btu/h and < 240,000 Btu/h	2.50 / 2.39	
	≥ 240,000 Btu/h	2.40 / 2.29	
Air conditioners, water cooled with fluid economizer	<65,000 Btu/h	2.55 / 2.44	ANSI/ASHRAE 127
	≥ 65,000 Btu/h and < 240,000 Btu/h	2.45 / 2.34	
	≥ 240,000 Btu/h	2.35 / 2.24	
Air conditioners, glycol cooled (rated at 40% propylene glycol)	<65,000 Btu/h	2.50 / 2.39	ANSI/ASHRAE 127
	≥ 65,000 Btu/h and < 240,000 Btu/h	2.15 / 2.04	
	≥ 240,000 Btu/h	2.10 / 1.99	
Air conditioners, glycol cooled (rated at 40% propylene glycol) with fluid economizer	<65,000 Btu/h	2.45 / 2.34	ANSI/ASHRAE 127
	≥ 65,000 Btu/h and < 240,000 Btu/h	2.10 / 1.99	
	≥ 240,000 Btu/h	2.05 / 1.94	

a. net sensible cooling capacity: The total gross cooling capacity less the latent cooling less the energy to the air movement system. (Total Gross – latent – Fan Power)  
b. sensible coefficient of performance (SCOP-127): a ratio calculated by dividing the net sensible cooling capacity in watts by the total power input in watts (excluding re-heaters and humidifiers) at conditions defined in ASHRAE Standard 127. The net sensible cooling capacity is the gross sensible capacity minus the energy dissipated into the cooled space by the fan system.

**C403.2.4.2 Set point overlap restriction.** Where used to control both heating and cooling, zone thermostatic controls shall provide a temperature range or deadband of at least 3°F (1.7°C) within which the supply of heating and cooling energy to the zone is capable of being shut off or reduced to a minimum.

#### **Exceptions:**

1. Thermostats requiring manual changeover between heating and cooling modes.
2. Special occupancy or special applications where wide temperature ranges are not acceptable and are approved by the Authority Having Jurisdiction (AHJ).

**C403.2.4.3.1 Thermostatic setback capabilities.** (We removed the existing language and replaced it with the following including adding the exceptions) Heating systems shall be equipped with controls that have the capacity to automatically restart and temporarily operate the systems as required to maintain zone temperatures above a heating set point adjustable down to 55°F (13°C) or lower. Cooling systems shall be equipped with controls that have the capacity to automatically restart and temporarily operate the system as required to maintain zone temperatures below a cooling set point adjustable up to 90°F (32°F) or higher or to prevent high space humidity levels.

### **Exceptions:**

1. Radiant floor and radiant ceiling heating systems.
2. Spaces where constant temperature conditions must be maintained.

**C403.2.4.4 Shutoff damper controls.** Both outdoor air supply and exhaust dampers shall be equipped with motorized dampers in compliance with C402.4.5.2 that will automatically shut when systems or spaces served are not in use.

**(We removed the 3 exceptions)**

**C403.2.4.5 Freeze Protection and snow melt system controls.** Freeze protection systems, such as heat tracing of outdoor piping and heat exchangers, including self-regulating heat tracing, shall include automatic controls capable of shutting off the system when outdoor air temperatures are above 40°F (4°C) or when the conditions of the protected fluid will prevent freezing. Snow and ice-melting systems, supplied through energy service to the building, shall include automatic controls capable of shutting off the system when the pavement temperature is above 50°F (10°C) and no precipitation is falling and an automatic or manual control that will allow shutoff when the outdoor temperature is above 40°F (4°C) so that the potential for snow or ice accumulation is negligible.

### **C403.2.6 Energy recovery ventilation systems.**

Where the supply airflow rate of a fan system exceeds the values specified in Table C403.2.6, the system shall include an energy recovery system. The energy recovery system shall have the capability to provide a change in the enthalpy of the outdoor air supply of not less than 50 percent of the difference between the outdoor air and return air enthalpies, at design conditions. Where an air economizer is required, the energy recovery system shall include a bypass or controls which permit operation of the economizer as required by Section C403.4.

### **Exception:**

An energy recovery ventilation system shall not be required in any of the following conditions:

1. Where energy recovery systems are prohibited by the *International Mechanical Code*.
2. Laboratory fume hood systems that include at least one of the following features:
  - 2.1. Variable-air-volume hood exhaust and room supply systems capable of reducing exhaust and makeup air volume to 50 percent or less of design values except when higher volumes are required to maintain safe operating conditions.
  - 2.2. Direct makeup (auxiliary) air supply equal to at least 75 percent of the exhaust rate, heated no warmer than 2°F (1.1°C) above room setpoint, cooled to no cooler than 3°F (1.7°C) below room setpoint, no humidification added, and no simultaneous heating and cooling used for dehumidification control.
3. Systems serving spaces that are heated to less than 60°F (15.5°C) and are not cooled.
4. Where more than 60 percent of the outdoor heating energy is provided from site-recovered or site solar energy.
5. Heating energy recovery in Climate Zones 1 and 2.

6. Cooling energy recovery in Climate Zones 3C, 4C, 5B, 5C, 6B, 7 and 8.
7. Systems requiring dehumidification that employ energy recovery in series with the cooling coil.
8. Where the largest source of air exhausted at a single location at the building exterior is less than 75 percent of the design *outdoor air* flow rate.
9. Systems expected to operate less than 20 hours per week at the outdoor air percentage covered by Table C403.2.6.
10. Systems exhausting toxic, flammable, paint, or corrosive fumes or dust.
11. Commercial kitchen hoods used for collecting and removing grease vapors and smoke.

**TABLE C403.2.6 EXHAUST AIR ENERGY RECOVERY REQUIREMENT**

CLIMATE ZONE	PERCENT (%) OUTDOOR AIR AT FULL DESIGN AIRFLOW RATE					
	≥ 30% and < 40%	≥ 40% and < 50%	≥ 50% and < 60%	≥ 60% and < 70%	≥ 70% and < 80%	≥ 80%
	DESIGN SUPPLY FAN AIRFLOW RATE (cfm)					
3B, 3C, 4B, 4C, 5B	NR	NR	NR	NR	≥ 5000	≥ 5000
1B, 2B, 5C	NR	NR	≥ 26000	≥ 12000	≥ 5000	≥ 4000
6B	≥ 11000	≥ 5500	≥ 4500	≥ 3500	≥ 2500	≥ 1500
1A, 2A, 3A, 4A, 5A, 6A	≥ 5500	≥ 4500	≥ 3500	≥ 2000	≥ 1000	> 0
7, 8	≥ 2500	≥ 1000	> 0	> 0	> 0	> 0

NR = not required

**C403.2.7 Duct and plenum insulation and sealing.** (We removed the existing language and replaced it with the following including adding the following) Insulation shall be protected from damage, including that due to sunlight, moisture, equipment maintenance and wind. Insulation exposed to weather shall be suitable for outdoor service and shall be protected by aluminum, sheet metal, painted canvas, plastic cover or other similar materials approved by the building official. Cellular foam insulation shall be protected as above or painted with a coating that is water retardant and provides shielding from solar radiation that can cause degradation of the material. All supply, and return, exhaust and relief air ducts and plenums shall be insulated according to Table C403.2.7.

Exception 1. Where located within equipment

(Exception #2 is removed)

All ducts, air handlers and filter boxes shall be sealed. Joints and seams shall comply with Section 603.9 of the *International Mechanical Code*.

**C403.2.7.1 Duct construction.** Ductwork shall be constructed and erected in accordance with the *International Mechanical Code*.

**C403.2.7.1.2 Medium-pressure duct systems.** All ducts and plenums designed to operate at a static pressure greater than 2 inches water gauge (w.g.) (500 Pa) but less than or equal to 3 inches w.g. (750 Pa) shall be insulated and sealed in accordance with Section C403.2.7. Pressure classifications specific to the duct system shall be clearly indicated on the construction documents in accordance with the *International Mechanical Code*.

**C403.2.7.1.3 High-pressure duct systems.** Ducts designed to operate at static pressures in excess of 3 inches water gauge (w.g.) (750 Pa) shall be insulated and sealed in accordance with Section C403.2.7. In addition, ducts and plenums shall be leak-tested in accordance with the *SMACNA HVAC Air Duct Leakage Test Manual* with the rate of air leakage (CL) less than or equal to 4.0 ~~6.0~~ as determined in accordance with Equation 4-5.

$$CL = F/P^{0.65} \quad (\text{Equation 4-5})$$

where:

$F$  = The measured leakage rate, in cfm per 100 square feet of duct surface area.

$P$  = The static pressure of the test, which shall be equal to the design duct pressure class rating, in. w.c

Documentation shall be furnished by the designer demonstrating that representative sections totaling at least 25 percent of the duct area have been tested and that all tested sections meet the requirements of this section. Positive pressure leakage testing is acceptable for negative pressure ductwork.

**(New table added to the code)**

**TABLE C403.2.7**  
**MINIMUM REQUIRED DUCT AND PLENUM INSULATION**

<u>Ducts for Other Than Dwelling Units<sup>a,b</sup></u>	<u>Supply Duct Requirements<sup>c,d</sup></u>	<u>Return Duct Requirements<sup>c,d</sup></u>	<u>Exhaust Duct and Relief Duct Requirements<sup>c,d,e</sup></u>
<u>Exterior of building</u>	<u>R-8, V and W</u>	<u>R-8, V and W</u>	<u>R-8, V and W</u>
<u>Attics, garages and ventilated crawl spaces</u>	<u>R-8 and V</u>	<u>R-8 and V</u>	<u>R-6 and V</u>
<u>TD greater than 40°F</u>	<u>R-6 and V</u>	<u>None</u>	<u>R-6 and V</u>
<u>TD greater than 15°F and less than or equal to 40°F</u>	<u>R-6 and V</u>	<u>None</u>	<u>R-6 and V</u>
<u>Within cement slab or within ground</u>	<u>R-6 and V</u>	<u>R-6 and V</u>	<u>None</u>
<u>Within conditioned spaces</u>	<u>None<sup>f</sup></u>	<u>None</u>	<u>None</u>
<u>TD less than or equal to 15°F</u>	<u>None</u>	<u>None</u>	<u>None</u>

<u>Ducts for Dwelling Units<sup>a</sup></u>	<u>Requirements<sup>c,d</sup></u>
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Exterior of building	R-8, V and W
Attics, garages and ventilated crawl spaces (except exhaust ducts)	R-8 and V
Exhaust ducts in attics, garages and ventilated crawl spaces	R-6 and V
Outdoor air intakes within conditioned spaces	R-6 and V
Exhaust ducts within conditioned spaces <sup>c</sup>	R-6 and V
Within cement slab or within ground	R-6 and V
Within conditioned spaces	None

- a. Ducts located within the building thermal envelope shall be located completely on the conditioned side of the air barrier.
- b. TD = Design temperature difference between the air in the duct and the ambient temperature outside of the duct, unless the duct type and location is specifically identified above.
- c. V = Vapor retarder required in accordance with IMC Section 604.11. When a vapor retarder is required, duct insulation required by this section shall be installed without respect to other building envelope insulation.
- d. W = Approved weatherproof barrier.
- e. Insulation is only required in the conditioned space for a distance of 3 feet (914 mm) from the exterior or unconditioned space.
- f. If temperature rise is greater than 3°F from supply air to furthest outlet, duct insulation shall be required.

**C403.2.8.1 Protection of piping insulation.** Piping insulation shall be protected from damage, including that due to sunlight, moisture, equipment maintenance and wind, and shall provide shielding from solar radiation that can cause degradation of the material. Adhesive tape shall not be permitted. In addition, piping insulation shall comply with the following:

- a. Insulation exposed to weather shall be suitable for outdoor service and shall be protected by aluminum, sheet metal, painted canvas, plastic cover or other similar materials approved by the building official. Cellular foam insulation shall be protected as above or painted with a coating that is water retardant and provides shielding from solar radiation.
- b. Insulation covering chilled-water piping or refrigerant suction piping located outside the conditioned space shall include a vapor retardant located outside the insulation (unless the insulation is inherently vapor retardant), all penetrations and joints of which shall be sealed.

**C403.2.10.1 Allowable fan floor motor horsepower.** Each HVAC system at fan system design conditions shall not exceed the allowable fan system motor nameplate hp (Option 1) or fan system bhp (Option 2) as shown in Table C403.2.10.1(1). This includes supply fans, return/relief fans, exhaust fans, and fan-powered terminal units associated with systems providing heating or cooling capability. Single zone variable-air-volume systems shall comply with the constant volume fan power limitation.

**Exception:** The following fan systems are exempt from allowable fan floor horsepower requirement.

1. Hospital, vivarium and laboratory systems that utilize flow control devices on exhaust and/or return to maintain space pressure relationships necessary for occupant health and

safety or environmental control shall be permitted to use variable volume fan power limitation.

2. Individual exhaust fans with motor nameplate horsepower of 1 hp or less

**TABLE C403.2.10.1(2) FAN POWER LIMITATION PRESSURE DROP ADJUSTMENT (Added two items to table)**

DEVICE	ADJUSTMENT
<b>Credits</b>	
Fully ducted return and/or exhaust air systems	0.5 inch w.c. (2.15 in w.c. for laboratory and vivarium systems)
Return and/or exhaust air flow control devices	0.5 inch w.c.
Exhaust filters, scrubbers, or other exhaust treatment.	The pressure drop of device calculated at fan system design condition
Particulate filtration credit: MERV 9 thru 12	0.5 inch w.c.
Particulate filtration credit: MERV 13 thru 15	0.9 inch. w.c.
Particulate filtration credit: MERV 16 and greater and electronically enhanced filters	Pressure drop calculated at 2x clean filter pressure drop at fan system design condition.
Carbon and other gas-phase air cleaners	Clean filter pressure drop at fan system design condition.
Biosafety cabinet	Pressure drop of device at fan system design condition.
Energy recovery device, other than coil runaround loop	$(2.2 \times \text{energy recovery effectiveness}) - 0.5$ inch w.c. for each airstream
Coil runaround loop	0.6 inch w.c. for each airstream
Evaporative humidifier/cooler in series with another cooling coil	Pressure drop of device at fan system design conditions
Sound attenuation section	0.15 inch w.c.
Exhaust system serving fume hoods	0.35 inch w.c.
Laboratory and vivarium exhaust systems in high-rise buildings	0.25 inch w.c./100 feet of vertical duct exceeding 75 feet
<u>Air blender</u>	<u>0.30 inch w.c.</u>

Preheat coil

0.10 inch w.c.

w.c. = water column

For SI: 1 inch w.c. = 249 Pa, 1 inch = 25.4 mm.

**C403.4.2.1 Static pressure sensor location.** Static pressure sensors used to control VAV fans shall be placed in a position such that the controller setpoint is no greater than one-third the total design fan static pressure, except for systems with zone reset control complying with Section C403.4.2.2. ~~For sensors installed downstream of major duct splits, at least one sensor shall be located on each major branch to ensure that static pressure can be maintained in each branch~~ Sensors shall be located in a position such that the controller set point is optimized to maintain the minimum static pressure required for system operation throughout its range.

**C403.4.3.3.3 Two position valve.** ~~Each hydronic heat pump on the hydronic system having a total pump system power exceeding 10 horsepower (hp) (7.5 KW) shall have a two-position automatic valve interlocked to shut off water flow when the compressor is off.~~

**C403.4.5.4 Supply-air temperature reset controls.**

Multiple zone HVAC systems shall include controls that automatically reset the supply-air temperature in response to representative building loads, or to outdoor air temperature. The controls shall be capable of resetting the supply air temperature at least 25 percent of the difference between the design supply-air temperature and the design room air temperature.

Zones with constant loads shall be designed for the fully reset supply temperature.

**Exceptions:**

1. Systems that prevent reheating, recooling or mixing of heated and cooled supply air.
2. Seventy five percent of the energy for reheating is from site-recovered or site solar energy sources.

**(Removed Exception 3)**

**C404.5 Pipe insulation.** ~~(We deleted the entire section and replaced it with the following language)~~ The following piping shall be thermally insulated in accordance with Table C403.2.8:

1. Recirculating system piping, including the supply and return piping of a circulating tank type water heater.
2. The first 8 feet of outlet piping for a constant temperature nonrecirculating storage system.
3. The inlet pipe between the storage tank and a heat trap in a nonrecirculating storage system.
4. Pipes that are externally heated (such as heat trace or impedance heating).
5. Domestic cold water systems with a temperature range of 40 - 60°F, where potential for condensation exists.

**C404.7.3 Covers:** Heated pools and inground permanently installed spas shall be provided with a vapor-retardant cover. Heated swimming pools covers shall be in compliance with Minnesota

Rules, part 4717.1575, the Minnesota Department of Health pool cover safety standard. Pools heated to more than 90 degrees Fahrenheit shall have a pool cover with a minimum insulation value of R-12.

**Exception:** A vapor-retardant cover is not required for pools deriving over 70 percent of the energy for heating from site-recovered energy, such as a heat pump or solar energy source computed over an operating season.

**C405.9 Voltage Drop.** Except feeder conductors and branch circuit conductors that are dedicated to emergency services, conductors shall be sized as follows:

1. Feeder conductors shall be sized for a maximum voltage drop of 2% at design load.
2. Branch circuit conductors shall be sized for a maximum voltage drop of 3% at design load.

**C408.2 Mechanical system commissioning and completion requirements.** Prior to passing the final mechanical inspection, ~~the registered design professional shall provide evidence of~~ mechanical systems commissioning and completion in accordance with the provisions of this section must be provided.

~~Construction document notes shall clearly indicate provisions for commissioning and completion requirements in accordance with this section and are permitted to refer to specifications for further requirements. Copies of all documentation shall be given to the owner and made available to the *code official* upon request in accordance with Sections C408.2.4 and C408.2.5.~~

**Exception:** The following systems are exempt from the commissioning requirements:

1. Mechanical systems in buildings where the total mechanical equipment capacity is less than 480,000 Btu/h (140 690 W) cooling capacity and 600,000 Btu/h (175 860 W) heating capacity.
2. Systems included in Section C403.3 that serve dwelling units and sleeping units in hotels, motels, boarding houses or similar units.

**C408.2.1 Commissioning plan.** ~~A commissioning plan shall be developed by a registered design professional or approved agency provided and shall include the following items:~~

1. A narrative description of the activities that will be accomplished during each phase of commissioning, including the personnel intended to accomplish each of the activities.
2. A listing of the specific equipment, appliances or systems to be tested and a description of the tests to be performed.
3. Functions to be tested, including, but not limited to calibrations and economizer controls.
4. Conditions under which the test will be performed. At a minimum, testing shall affirm winter and summer design conditions and full outside air conditions.

5. Measurable criteria for performance.

**C408.2.2.1 Air systems balancing.** Each supply air outlet and zone terminal device shall be equipped with means for air balancing in accordance with the requirements of Chapter 6 of the International Mechanical Code. Discharge dampers are prohibited. ~~On constant volume fans and variable volume fans with motors 10 HP (18.6 Kw) and larger.~~ Air systems shall be balanced in a manner to first minimize throttling losses then, for fans with system power of greater than 1 hp (0.74 kW), fan speed shall be adjusted to meet design flow conditions.

**(We removed the exception from this section)**

**C408.2.4 Preliminary commissioning report.** A preliminary report of commissioning test procedures and results shall be completed and certified by ~~the registered design professional or approved agency~~ an agency or individual approved by the Building Official and shall be provided to the building owner. The report shall be identified as "Preliminary Commissioning Report" and shall identify:

1. Itemization of deficiencies found during testing required by this section that have not been corrected at the time of report preparation.
2. Deferred tests that cannot be performed at the time of report preparation because of climatic conditions.
3. Climatic conditions required for performance of the deferred tests.